



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:	Docket No.: 36540
KRÍŽIK, Vladislav et al.	Confirmation No.: 6589
Serial No. : 10/554,163	Group Art Unit No.: 3745
Filed: October 21, 2005	
WATER WHEEL MOTOR	Examiner: VERDIER, Christopher M.

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

DEKLARÁCIA PODĽA 37 C.F.R. § 1.132

1. Ja, Vladislav Krížik, som jedným z pôvodcov menovaných v hore uvedenej veci patentovej prihlášky (ďalej len „Krížiková prihláška“). Absolvoval som Žilinskú Univerzitu odbor Strojárska technológia. Moje skúsenosti zahŕňajú prácu ako vývojový konštruktér, neskôr ako projektant stavebných strojov a hydraulických zariadení. Od roku 1990 pracujem v oblasti výskumu a vývoja v oblasti technológie, avšak najmä v oblasti hydromechaniky a hydrodynamiky prirodzených vodných tokov, zahŕňajúc vývoj technických zariadení napodobňujúcich prirodzené prvky vodných tokov, lodných elektrární pre vodné toky, mechanických štruktúr pre energetické účely, a zariadenia na odsávanie, filtráciu a transport uhoľného prachu. Ako osoba s odbornou znalosťou v oblasti vodnej energie, robím túto

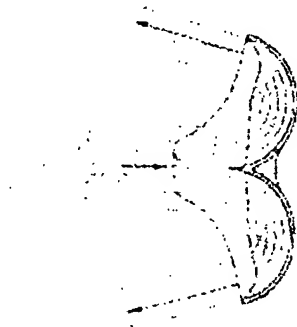
deklaráciu na podporu Krížikovej prihlášky vysvetlením technológie a osvedčením kľúčových rozdielov medzi navrhovaným vynálezom a stavom techniky.

2. Moje porozumenie anglického jazyka je obmedzené, preto osoba, ktorá rozpráva plynulo anglicky aj slovensky (môj rodný jazyk), pre mňa preložila túto deklaráciu.

3. Porozumel som, že prieskumový referent zamietol nároky hore uvedenej prihlášky ako predvídané buď U.S. patentom č. 1, 579,146 Richardson (ďalej len " '146 patent"), alebo U.S. patentom č. 4,950,130 Erlach (ďalej len " '130 patent"). Najvýznamnejší rozdiel medzi vynálezom v Krížikovej prihláške a náukou patentov '146 a '130 je, že tieto patenty sa týkajú vodných turbín, zatiaľ čo nároky Krížikovej prihlášky hovoria o prítomnosti vodného kolesa. Priemerní odborníci v oblasti ich rozlišujú ako dva rozličné typy zariadenia. Vodná turbína premieňa kinetickú energiu vody na mechanickú energiu rotora. Toto sa uskutočňuje vo vnútri skrine turbíny, zmenou smeru prúdenia vody kombináciou obtekaním turbínových lopatiek a skrine turbíny. **Skriňa turbíny je nevyhnutná časť štruktúry turbíny pre dosiahnutie požadovaných parametrov.** Vodné turbíny sú len pre veľké spády s vysokou operačnou rýchlosťou. Vodné kolesá, naopak, tento efekt nevyužívajú. Skôr vodné kolesá prirodzene sú navrhované na použitie s relatívne malými spádmi, sú pomalobežné a nevyžadujú skriňu na uzavretie oblasti, v ktorej sa otáčajú. Lopatky vodného kolesa sú ponorené do tečúcej vody, čím je energia prúdu vody proti lopatkám prenesená na lopatky a koleso. Všeobecne bolo

chápané priemerným odborníkom v oblasti, že vodné koleso nemôže byť efektívne opatrené rovnotlakými lopatkami, ako môže byť použité v Peltonovej turbíne, nakoľko vodné koleso je navrhované na pomalobežné fungovanie a nemá skriňu. Následkom toho vodné turbíny boli požadované za účelom vytvorenia väčšieho množstva energie pri porovnaní s vodným kolesom rovnakej veľkosti. Pokiaľ vytvárajú viac energie ako vodné kolesá, vodné turbíny sú drahšie a požadujú prídavné zariadenia na podporu ich fungovania. Význam používania vodných kolies v tomto vynáleze je detailnejšie vysvetlený ďalej.

4. Ďalší dôležitý rozdiel medzi vynálezom Krížikovej prihlášky a náukou patentov '146 a '130 je, že súčasné nároky hovoria, že lopatky na vodnom kolese sú rovnotlaké. Žiaden z uvádzaných patentov neinformuje ani neodporúča používanie rovnotlakých lopatiek. Priemerný odborník v oblasti rozumie, že rovnotlaká lopatka je konfigurovaná takým spôsobom, že voda prúdi na ňu len z jednej strany plochy lopatky a tvar lopatky zmení smerovanie jej rýchlostného vektoru v smere čo možno najbližšie k 180° od pôvodného smeru vodného prúdu. Obrázok dole ilustruje spôsob ktorým rovnotlaké lopatky menia smerovanie vodného prúdu.

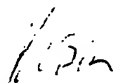


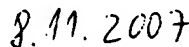
5. Použitie izobarických lopatiek na vodnom kolese je kľúčovým znakom v tomto vynáleze a to prináša neočakávaný následok. Tým je, že izobarické lopatky umožňujú výkonnú výrobu energie vodným kolesom, nie turbínou a to nebolo dosiahnuté pred týmto vynálezom. Dosiahnutie toho bez použitia vodnej turbíny je významné a všetky ďalšie zariadenia a náklady spojené s vodnou turbínou sú obídene.

6. Ako podporu na pochopenie charakteristík a fungovania tohto vynálezu prieskumového referenta, je priložená ako Vecný dôkaz A fotografia ukazujúca vodné koleso podľa tohto vynálezu. Toto vodné koleso zahŕňa lopatky majúce rovnotlaké vlastnosti ako je ukázané na ilustrácii hore. Ďalej, tento vynález získal uznanie na Slovenku a v súčasnosti je v používaní. Keďže to môže napomôcť pochopeniu vynálezu prieskumovým referentom, ako výhody realizované týmto vynálezom, ktorý používa rovnotlaké lopatky, je ako Vecný dôkaz B

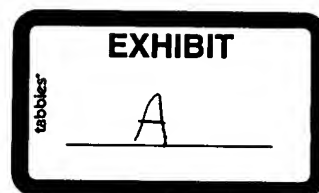
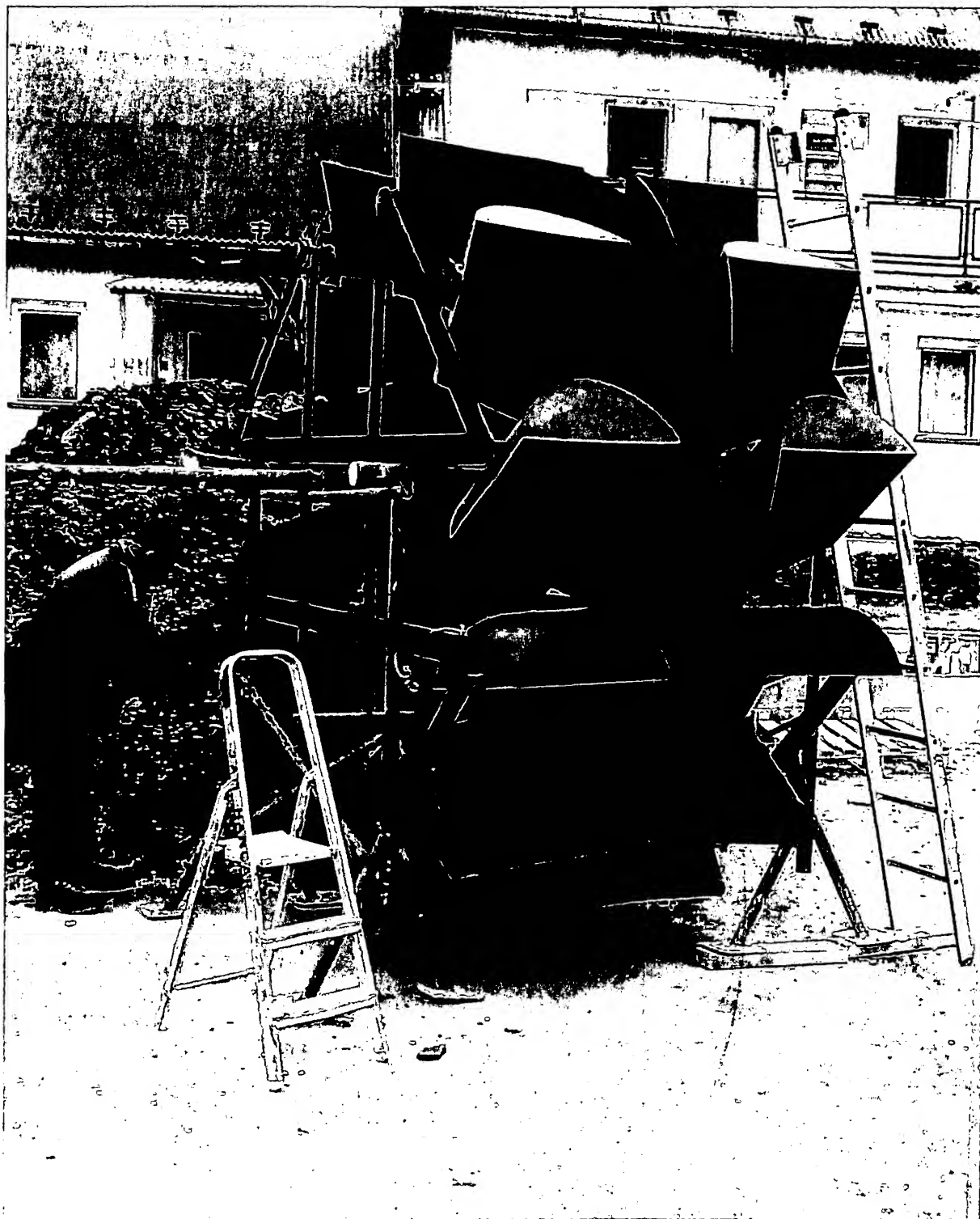
priložené CD ktoré obsahuje segment z televíznych novín uvádzajúci tento vynález. Ja som jednou z osôb ktorá v relácii vystupuje, s ktorou bol robený rozhovor v súvislosti s týmto segmentom z televíznych novín. Vysielanie tohto segmentu televíznych novín je významné v demonštrovaní jedinečnosti tohto dizajnu vodného kolesa a jeho použiteľnosti v spojení s výrobou energie.

7. Ďalej deklarujem, že všetky prehlásenia urobené v tomto dokumente sú mojou vlastnou vedomosťou a sú pravdivé, a že prehlásenia urobené v tomto dokumente o informáciách a presvedčeniach sú považované za pravdivé; a taktiež že tieto prehlásenia boli urobené s vedomím, že zámerne nepravdivé vyhlásenia či vyhlásenia tohto druhu takto urobené sú trestateľné pokutou alebo trestom odňatia slobody, alebo oboma, podľa časti 1001 právnej listiny 18 Kódexu Spojených štátov, a že takéto nepravdivé vyhlásenie môže ohroziť platnosť prihlášky, ako aj patentu vydaného na jej základe, alebo ktoréhokoľvek patentu, ku ktorému táto deklarácia smeruje.



Vladislav Krížik

Dátum



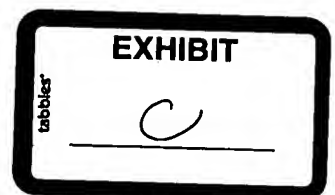
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Principles

Traditional Waterwheels

Watermills are one of man's earliest inventions. The first known reference to one is in 85 BC, but they were undoubtedly in use long before then. They fulfilled one of man's most basic needs — grinding grain to make flour.

Two basic kinds of early waterwheels can be distinguished, the vertical axis wheel, and the horizontal axis wheel.

The former was probably the first to be used and has become known as the "Greek mill", though it may have originated in the Middle East and was used throughout northern Europe. It is best suited to hilly country with small fast-flowing streams. The horizontal axis wheel became known as the "Roman mill" because it was used throughout the Roman Empire. It is suitable for larger, slower, streams and requires extensive gearing to transmit the force.

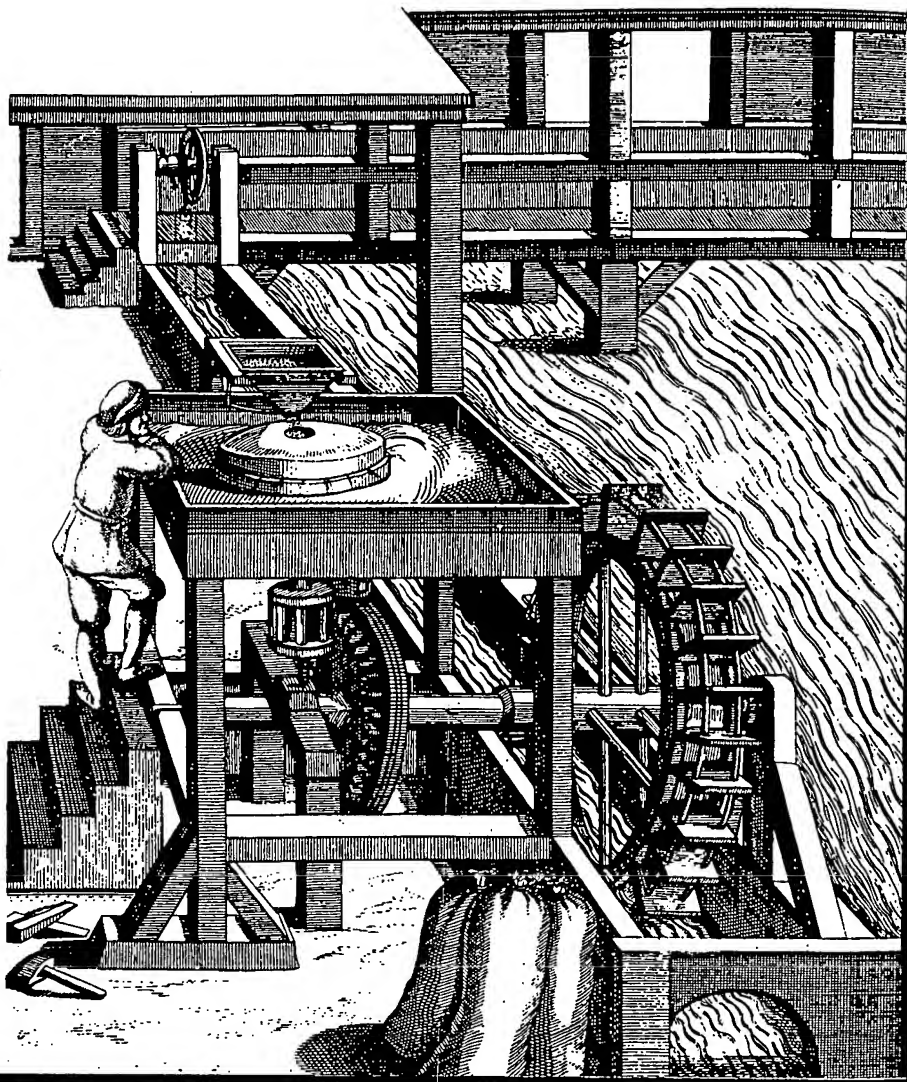
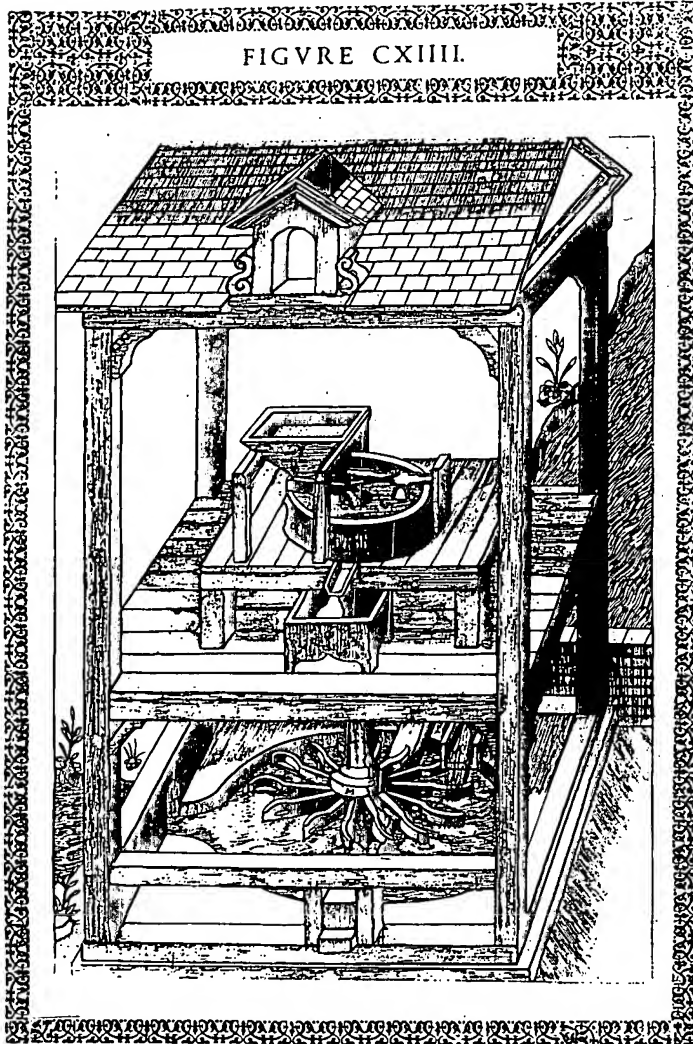


FIGURE CXIII.

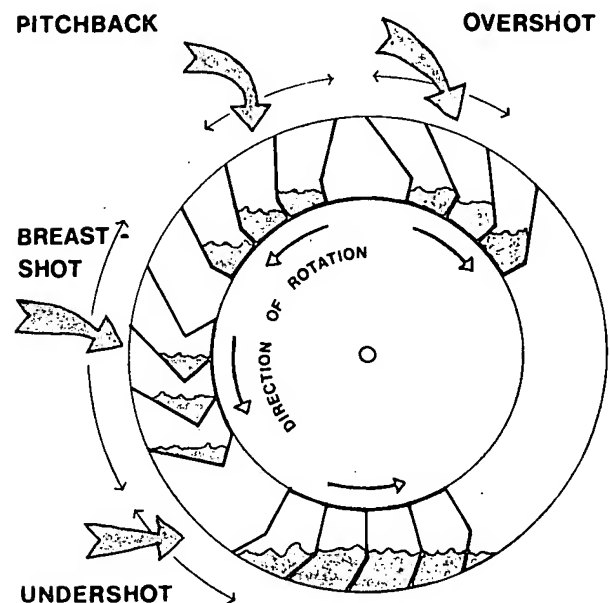


Above: Vertical-axis watermill from *Theatrum Machinarum Novum* by G. A. Bockler, c. 1662.
 Left: Horizontal-axis watermill from *Le Diverse et Artificiose Machine* by Agostino Ramelli, 1588.
 Both illustrations reprinted from *Windmills and Watermills* by John Reynolds, Praeger, 1970.

The earliest horizontal axis waterwheels were *undershot*, that is, only the bottom paddles were submerged in the stream. However, during the later Roman period the more efficient "overshot" wheel was developed. The water was fed onto the top of the wheel so that both the weight of the water and the impact of the stream flow were used for turning the wheel. The overshot wheel requires a good *head* of water, that is, the supply of water falling onto the wheel must be significantly higher than the level of the water leaving the wheel (called the *tailwater*). The overshot design was common throughout Europe until the industrial revolution.

Although traditional waterwheels like these turn slowly and are best suited for pumping or grinding grain or driving machinery, it is possible to gear them up to turn the armature of a small generator to produce electricity.

The overshot wheel has the most efficient design of any traditional waterwheel, though undershot and breastshot wheels are quite useful for high rates of flow with low head. Overshot wheels have several advantages over the more sophisticated water turbines. They require little maintenance and operate well despite fluctuations in the rate of flow of the stream. They are not affected by trash and grit that may be



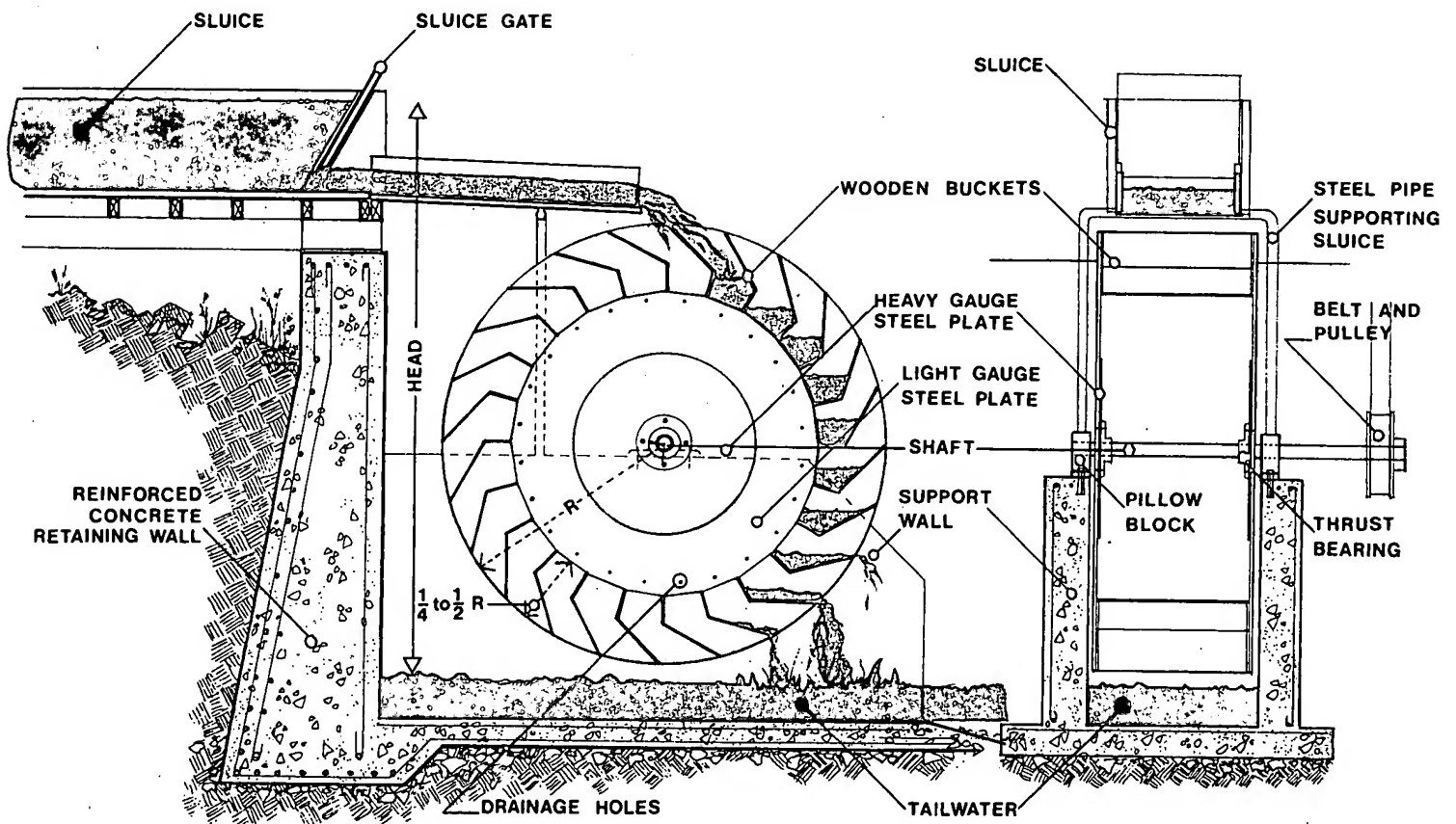
Horizontal-axis waterwheels. Where the water hits the wheel determines the design and the efficiency.

floating in the water (heavy objects like logs pass out over the wheel and fall clear by virtue of their own momentum). They are much easier to build than more modern turbines as they do not require machine tooling or accurate balancing.

The water must be brought to the top of an overshot wheel by a sluice (or "penstock") which should be about 6 inches above the wheel and should have a sluice gate to regulate the flow of water. The water should fall into the buckets just as they pass the top of their circuit. The buckets should hold the water until they reach the bottom of their circuit, thus deriving the maximum benefit from the water's weight. For optimum efficiency, with a limited amount of water, the buckets should be filled only about one-quarter full so that the water does not spill out until the last possible moment. The amount of water in the buckets is regulated by the sluice gate.

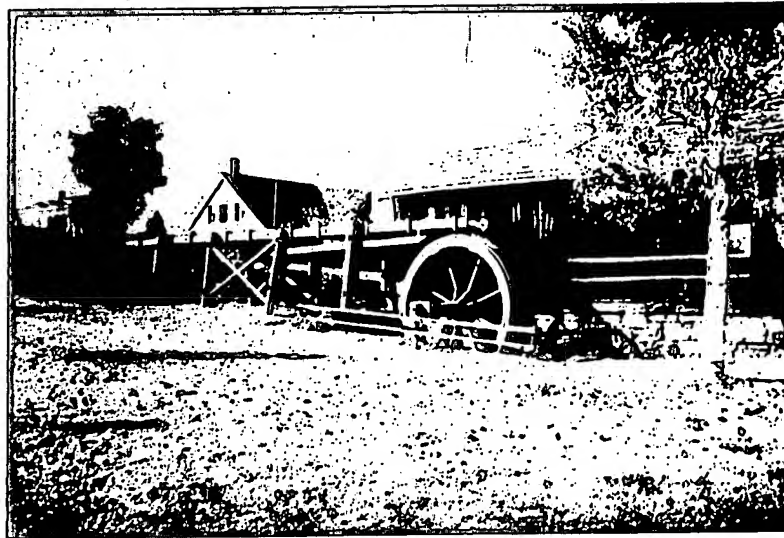
The buckets are held in place by a pair of wheels. These can be constructed from strong wood or steel. A drum type wheel is probably the

A Simple Overshot Waterwheel.

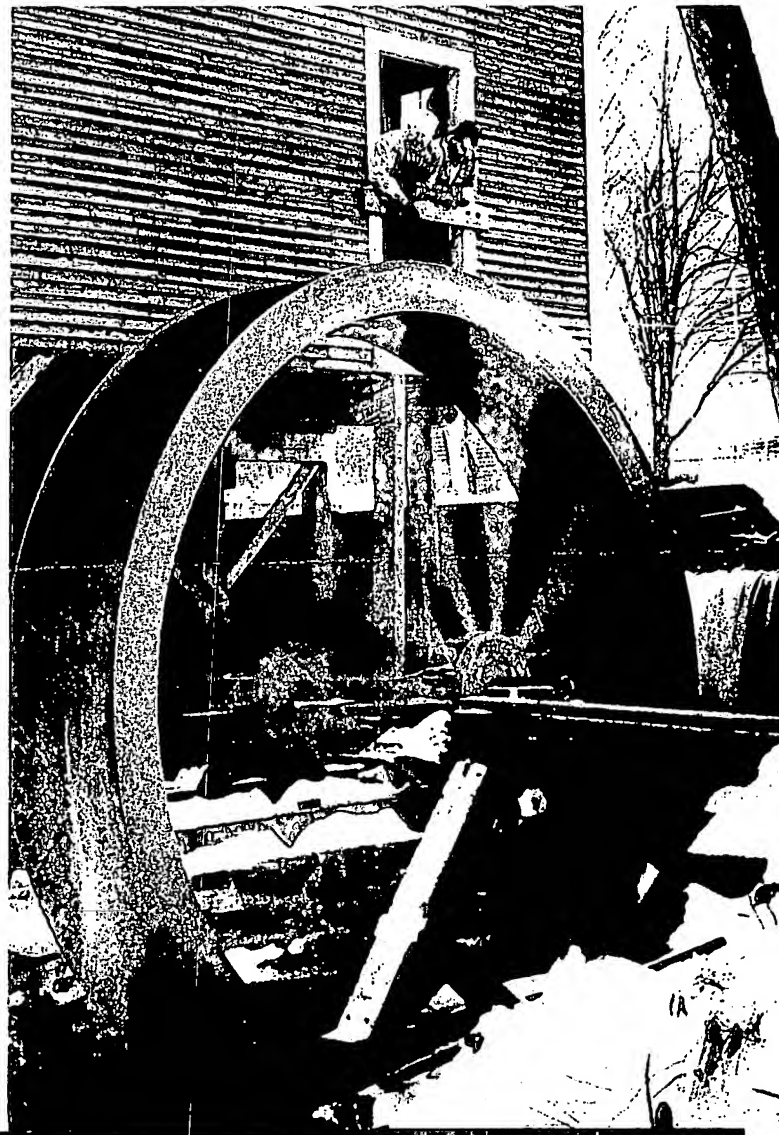


easiest to construct since it avoids the problems of making spokes.

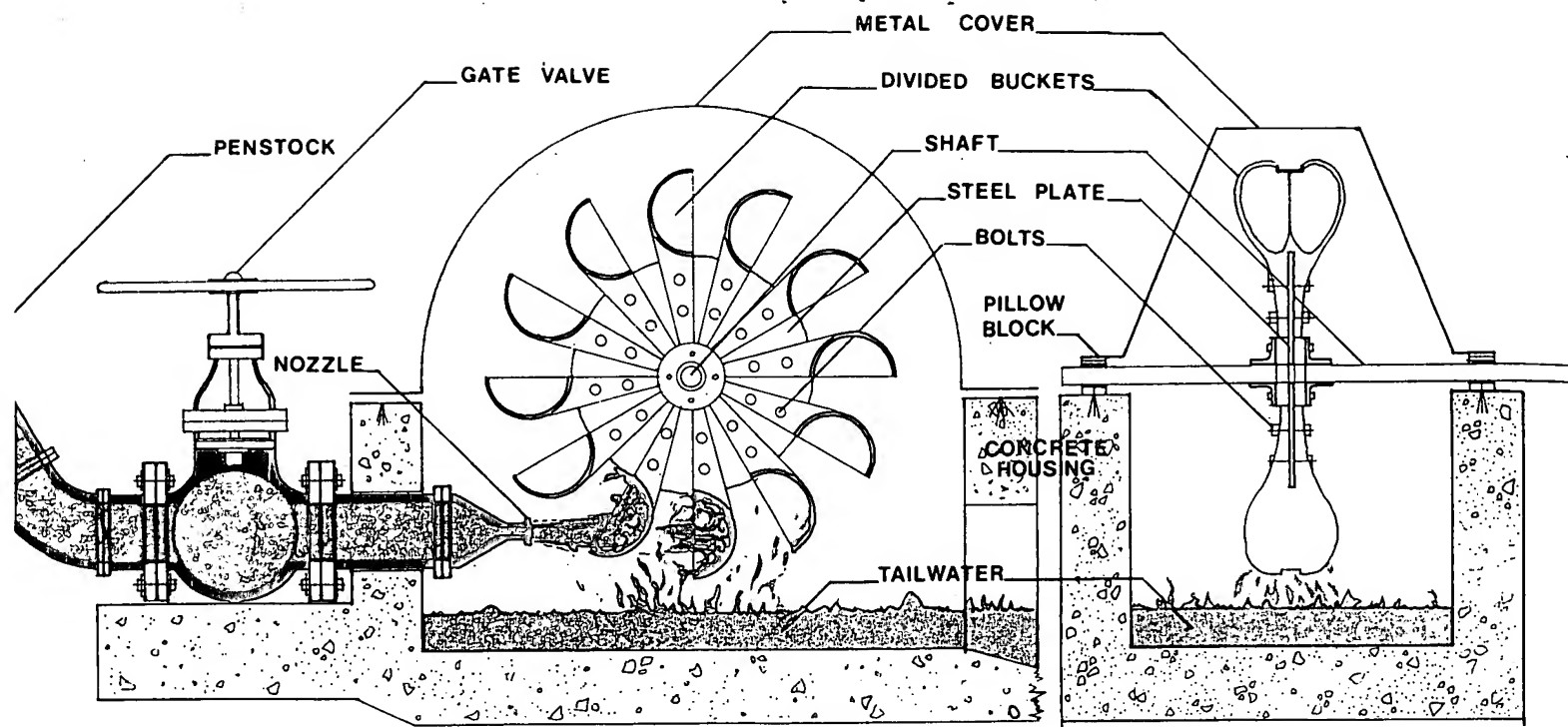
Overshot wheels need at least enough head to clear the wheel (usually about 8 feet) and work well with heads of up to 30 feet. The *flow* of water, that is the amount and velocity of water passing a given point in the stream, is also important. Overshot wheels work best with a flow of 1 to 30 cubic feet per second. The power available in a stream is directly related to the head and the flow. The amount of that power an overshot wheel can capture is determined by the diameter and width of the wheel. At best, an overshot wheel can use up to 60-80 percent of the available power. But the wheel turns at between 2 and 12 revolutions per minute, which is much lower than the speed required by a generator, so for producing electricity an overshot wheel's efficiency is reduced by friction losses in the gearing and belting necessary to increase the rotational speed enough to power a generator.



*Courtesy of David Abrams,
Burlington, Vermont. Photograph
of Shelburne Museum in Vermont.*



A 16-foot high pitchback waterwheel built from scrap parts by Frank Gibson and Ben Duffy, installed in an existing millrace. It can generate up to 10 h.p., and is used for grinding grain as well as generating electricity for lights. Photograph, Courtesy Vermont Life and Walter Hard.



A simple Pelton wheel which can be built from sheet metal.

Modern Water Turbines

During the *Industrial Revolution*, careful study of the way water flows led to the development of turbines, which feed the incoming water through guide vanes onto the blades of the rotating wheel at a precise angle. The sophisticated design of both blades and guides causes the wheel to turn at the high speeds necessary for generating electricity. Modern turbines are so efficient that they often capture over 90 percent of the energy available in the water.

There are two kinds of turbines, impulse turbines and reaction turbines.

A simple impulse turbine, such as the Pelton wheel, uses a nozzle to increase the pressure of the incoming water. The water shoots out of the nozzle, hits a divided bucket and is deflected in a double curve. It then falls into the tailwater, having given up almost all of its momentum. The impulse turbine uses the force of the velocity of the water rather than its weight.

Very little water (a low flow—at least 1 cubic foot per second) but high speed and pressure (high head—at least 50 feet) are needed to run an impulse turbine efficiently. Above these levels, variations in rate of flow and amount of head do not significantly reduce its efficiency.

For impulse turbines, the head is measured from the level of the water supply to the level of the nozzle rather than of the tailwater. But this difference is small since the nozzle and wheel should be mounted as close to the tailwater as is possible without touching it even at times of high water.

The nozzle for an impulse turbine should be carefully aimed, so that the jet of water hits each bucket perpendicularly and is evenly divided by the centre ridge. A gate valve in the nozzle regulates the flow for maximum efficiency. A deflector can divert the water from the buckets if the wheel needs to be stopped suddenly. The buckets should be as smooth and evenly balanced as possible to minimize friction.

An impulse turbine is more difficult to build than a simple overshot wheel, but it is better suited for generating electricity since it rotates at higher speeds (approximately half the speed of the incoming jet of water). A certain amount of machine tooling is necessary to create an efficient impulse wheel. Because of the high pressure of the water, both the nozzle and the buckets will gradually wear down and should be made easily replaceable.